

1/10/22

- everything you need for the class is on the website (google his name)
- python is a programming language
- imaging relevant to a wide range of industries
- github, open-source programming
- in C, you allocate & release memory manually
- exams open-book
- labs are practical, exams are theoretical
- programming in a command line environment

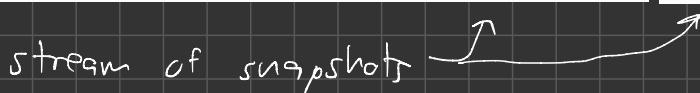
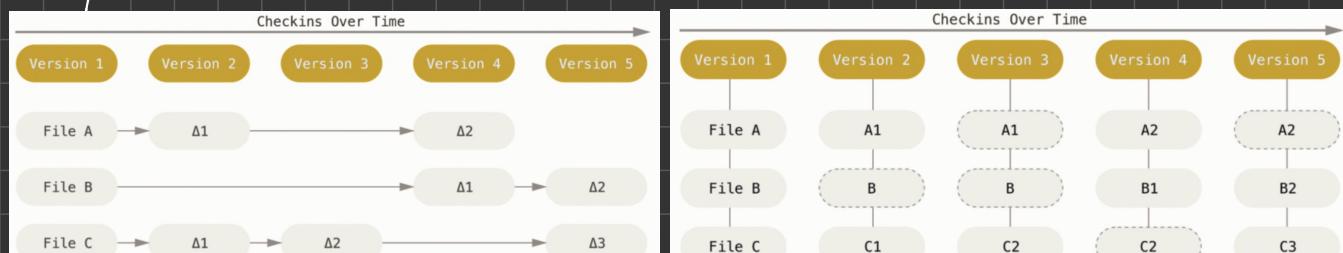
- download tools necessary to run first lab (C compiler, etc)
- be sure to install the 64-bit compiler
- get Anaconda
- what is a shell script?
- take labs very seriously
- DO NOT GET BEHIND
- commercial, medical, scientific, industrial

Git Notes

Version Control System (VCS)

Local vs Centralized vs Distributed Version Control Systems

Snapshots, Not Differences



One method - run git from command line

For Windows: will use either Command Prompt or Windows Powershell

- more documentation and cheat sheet of common commands available on website

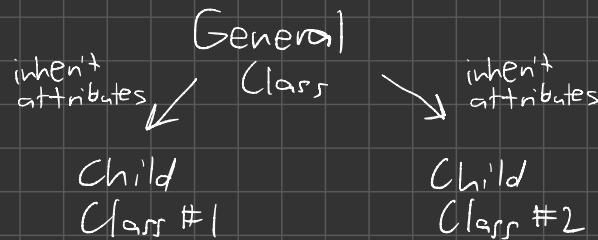
Python Object Oriented Programming Notes

- an object is an instance of a class
- that class defines how the object can interact with other things in the program
- method : used with dot operator to act on an object, a function that goes inside of a class
- class construction, initialization, etc,
- classes can interact

what is an f string?

* Inheritance

- lower level class(es) inherit from an upper level class



class Specific(General):

- any methods in child class with same name will override super().__init__(x, y)

references the super class (class you inherit from)

variables passed from parent __init__ method

Class Attributes

- not defined inside of any method, does not have access to an instance of the class
- defined for the entire class, which means that it is not specific to an instance
- method caller can actually be the class name instead of the individual instance
- class attributes could be used as constants for future use
- generally, classes are exportable if can be robust

Class Methods

@classmethod written on line above class method

- can influence & change class attributes

def method_name(cls)

vs self for standard instance method

Static Methods

@staticmethod written on line above static method

- More of an organizational thing

- doesn't access anything, so don't need a self or cls call for construction

Everything we work with is an object in some sense

The following fundamental notions of object-oriented programming in general apply to object-oriented Python also:

- Class, Instances, and Attributes
- Encapsulation
- Inheritance
- Polymorphism

- Python makes a distinction between **function objects** and **callables**. While all function objects are callables, not all callables are function objects.

- A **function object** can only be created with a **def** statement.
- On the other hand, a **callable** is any object that can be called like a function.
- For example, a **class name** can be called directly to yield an instance of a class. Therefore, a class name is a callable.
- An instance object can also be called directly; what that yields depends on whether or not the underlying class provides a definition for the **system-supplied __call__()** method.

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3 Pillars of Class:
Probability
Linear Systems Theory
Programming

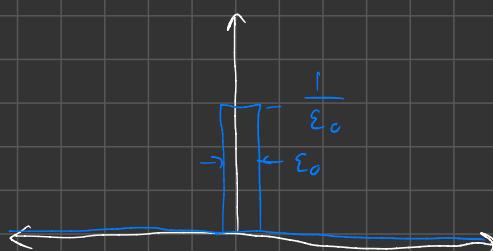
linear systems
ECE 301 - get textbook for
ECE 302 - get textbook for
probability

make file - how code is compiled
Labs get ahead of the lectures - theory after application
- analog cameras - low latency

Continuous Time Fourier Transform

Oppenheim & Willsky ??

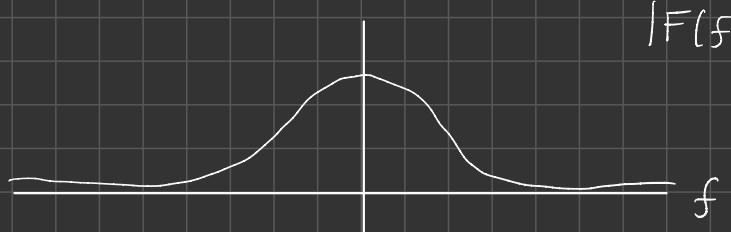
- decompose a signal into linear combination of sine waves



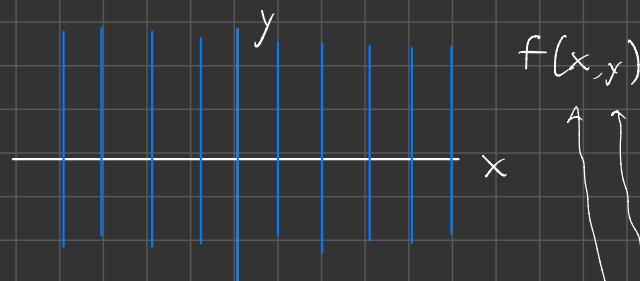
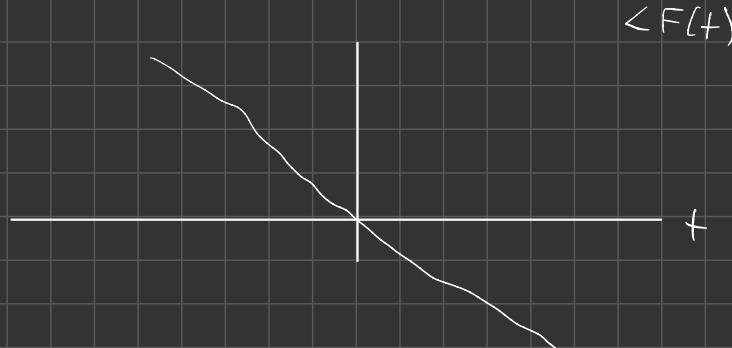
delta function is an operator \rightarrow can return value at $g(0)$

convolution in time is related to _____ in frequency

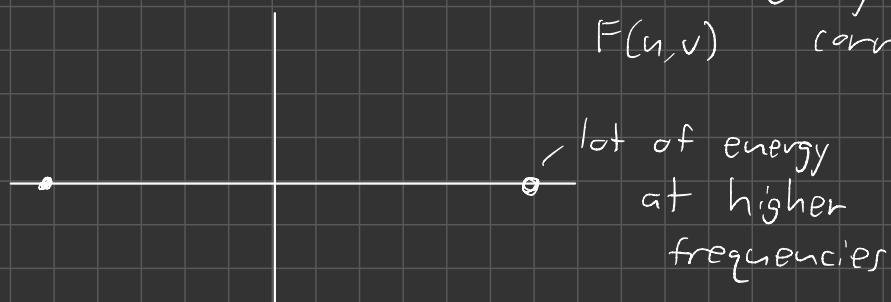
Fourier transform usually real valued



signals are conjugate



frequency variables that
 $F(u,v)$ correspond to x,y

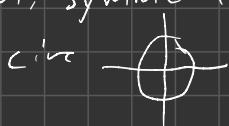


CTFT, CSFT - usually analytical, computer processes discretely

latency \rightarrow delay

NTSC



1080p progressive vs 1080i interlaced
not rot. symmetric / rot. symmetric
rect:  circ: 

definition of separable - see course notes
recall the record player example

shifting in time - linear modulation in frequency
phase is linear; output is a time delay of the input \Rightarrow
antenna is a band-pass system
convolution is commutative
energy measured in time domain = energy measured in frequency domain

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FIR (Finite Impulse Response) Filter

PSF - Point Spread Function

IIR (Infinite Impulse Response) Filter

look more into function separability ??

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Office Hours Scratch Notes

first page ~ free boundary condition & filtering
don't want to use integer to do filtering ??
turn into float, then turn back to integer ??

ECE538 ??

need to learn certain libraries

'conda env list'

'conda activate ____'

create environment for ECE637

code instructions in lab - make sure to view

most exam problems come from previous exams, with minor changes

conjugation - real part & complex part

real part stays same and imaginary becomes negative

1/14/22

- submit lab on Brightspace
- look through Git page that Dr. Bauman shared with us
- old exams and key